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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,106	10/09/2003	Mun Ho Jung	3449-0276P	8106

2292 7590 12/29/2005

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EXAMINER	
LOUIS JACQUES, JACQUES H	
ART UNIT	**PAPER NUMBER**
3661	

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/681,106	Applicant(s) JUNG ET AL.	
	Examiner Jacques H. Louis-Jacques	Art Unit 3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *11* is/are allowed.

6)☐ Claim(s) *1-4,6,9 and 10* is/are rejected.

7)☒ Claim(s) *5,7,8 and 12-14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 6, and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathis [5,948,043] in view of Wood et al [US 2005/0065722].

Mathis discloses a navigation method and system using GPS data for tracking an object (i.e., estimating a location of the object). According to Mathis, there is provided: receiving GPS location data from a moving object (e.g., an automobile). See abstract, figures 1, 2 [200]; determining GP'S shadow area by using the received a GPS location data. See figures 2 [202], 3, 4, 8; calculating a moving straight distance of the moving object, with reference to a last GPS location data in visible regions when the moving object is in a GPS shadow area. See figure 8, column 12; calculating a virtual location data by using the calculated moving straight distance of the moving object. See figure 2 [204], 5-7 and 8, and columns 7, 12; and calculating an estimated location on a digital numeric map positioned nearest from the virtual location data, and performing a map-matching to provide a navigation service. See abstract, figures 2 [206], 8. Mathis also discloses calculating an identifying value on reliability of GPS location data by using GPS location dada from a plurality of GPS satellites (abstract, figures 1, 2, columns 4-6); comparing the calculated identifying value with a set value (abstract, columns 4-6); and if

the identifying value is greater than or equal to the set value, determining that the location of the moving object is in the shadow area, and if the identifying value is less than the set value, determining that the location of the moving object is in the visible region (columns 5-6 and 7 [21-34]). According to Mathis, the identifying value of the reliability of the GPS location data is a horizontal dilution of precision (HDOP). See abstract, columns 5-6. The location of the moving object, according to Mathis, is estimated using the GPS location data or dead reckoning (DR) technique when the location of the moving object is determined to be in the visible region by using GPS location data. See columns 1, 3. As described above, Mathis discloses receiving GPS location data, determining GPS shadow area by using the received GPS location data, obtaining a map-matching value of a last GPS location data in visible regions when the moving object is in a GPS shadow area, and calculating moving straight distance of the moving object with reference to the map-matching value. In addition, Mathis discloses detecting interpolated points (i.e., by iteration) and link of location estimated using the calculated moving straight distance of the moving object, ascertaining whether the moving object is on the detected link, and estimating a moving location by using distance of the link, coordinates of the 'interpolated point, speed (velocity) of the moving object and length of the link if the moving object is on the detected link. See figures 5-8, columns 8-12. The link in traveling direction and the interpolated points connected to the link, according to Mathis, are detected on a digital numeric map by using moving straight distance calculated using speed (velocity) and time of the moving object and previous last map-matching location data. See column 10 [62-67] to column 12 and figure 8.

However, Mathis does not particularly discloses that the moving straight distance is calculated based on a non-GPS velocity of the moving object and an estimation unit time period. Wood et al, on the other hand, discloses a method and apparatus for estimating the location of a moving object. Wood et al discloses determining whether a moving object has entered a GPS shadow area, which corresponds to an area where received GPS location data is unreliable. Wood et al discloses using both a GPS and dead reckoning sensors (i.e., non-GPS) to estimate the location of a mobile object. See paragraphs [0005], [0006], and [0007]. In paragraph [0034], for example, Wood et al discloses calculating a straight distance based on a unit period of time and speed measurements obtained from speed sensor, i.e. non-GPS velocity. See also paragraphs [0044], [0048], [0050]-[0052]. Thus, it would have been obvious to one skilled in the art at the time of the invention to be motivated to modify the system of Mathis by incorporating the features from Wood et al because such modification, as suggested by Wood et al, would significantly reduce errors associated with the GPS while improving the availability and timeliness of a position solution.

With regard to claim 6, Mathis discloses the coordinates (longitude, latitude or X, Y) of the virtual location data (columns 6, 11). In addition, Mathis discloses coordinates (e.g., longitude and latitude) of previous map-matching location, speed of the moving object, angle of previous map-matching location, and time of the location of the moving object. See columns 6-7 and 10-11. However, neither Mathis nor Wood et al particularly

discloses the equations for determining the coordinates (longitude and latitude) of the virtual location data as:

longitude = longitude of previous map-matching location + speed of the moving object + **cos** (attitude angle of previous map-matching location) * time (sec), and

latitude = latitude of previous map-matching location + speed of the moving object * sin (attitude angle of previous map-matching location) * time (sec).

However, it would have been obvious to one of ordinary skilled in the art at the time of the invention to be motivated to use the disclosed components of the combination of Mathis and Wood et al to obtain the coordinates of the virtual location data because it would provide greater positioning accuracy, thereby enabling a highly accurate position (longitude and latitude) calculation.

Allowable Subject Matter

3. Claims 5, 7-8 and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. Claim 11 is allowed.

The prior art does not particularly disclose that the virtual location data is calculated using a reference point of any one of the last GPS location data in the GPS visible region and the estimated location data of the moving object in the shadow area, the calculated moving straight distance, and a due north reference angle between the due north and a link positioned along the moving straight distance. The prior art fails also to disclose that

a next location of the moving object in the shadow area is estimated using the calculated moving straight distance or residue moving straight distance of the moving object, coordinates of interpolated points connecting a corresponding link on the digital numeric map, a length of the corresponding link, and a due north reference angle of the corresponding link.

Response to Amendments & Arguments

5. The amendments along with the arguments filed on October 6, 2005 have been entered and carefully considered by the examiner.

Claim 11 has been rewritten into independent form incorporating the limitations of its base claim.

All the claims have been amended.

The claim object and rejection under 35 USC 112, 2nd paragraph have been withdrawn.

Applicant has amended the independent claims to recite that the moving straight distance is calculated based on a non-GPS velocity of the moving object and an estimation unit time period. Emphasis added.

Referring to the background of the invention, Applicant noted, "it is not easy to estimate the location of a moving object such as a mobile telephone in shadow areas in which GPS data is not received or is unreliable such as a tunnel or underground passage in which the quality of the received GPD location data is greatly lower." According to Applicant, the claims, as amended, recite "the moving straight distance is calculated based on a non-GPS velocity of the moving object and an estimation unit time period." Applicant

contented that "Mathis does not distinguish between a moving object in a GPS shadow area and GPS visible area." According to Applicant, "in Mathis, GPS signal is always required to determine a location of a moving object." See response at page 13.

While the examiner agrees that Mathis does not disclose using a non-GPS velocity to calculate the moving straight distance, such feature is not novel in the art. The use of an integrated GPS and INS for estimating a location of a moving object and guiding such mobile object in a navigation system is well known in the art.

In fact et al, Wood et al [US 2005/0065722] discloses a method and apparatus that solves the problem concerned by Applicant. Wood et al discloses determining whether a moving object has entered a GPS shadow area, which corresponds to an area where received GPS location data is unreliable. Wood et al discloses using both a GPS and dead reckoning sensors (i.e., non-GPS) to estimate the location of a mobile object. See paragraphs [0005], [0006], and [0007]. According to Wood et al, as described in figures 3 and 4, the speed or velocity is determined using vehicle speed sensor or an accelerometer mounted in the moving object (vehicle), i.e., non-GPS velocity. Wood et al recognizes that GPS signal are not always available or necessarily accurate or reliable. Therefore, Wood et al discloses using dead reckoning, which provided greater availability. See paragraph [0029]. In paragraph [0039], Wood et al describes some problems relating to GPS including shadowing where insufficient space vehicles (satellites) at any one time are visible to the [GPS] receiver to produce a reliable solution. Furthermore, in paragraph [0042], Wood et al described conditions where GPS signals are unreliable, i.e., when reception is poor, which include when the receiver is completely blocked from space

vehicle reception for example when it is under cover such as underground, tunnels, covered bridges, etc. Wood et al further adds that these are conditions when dead reckoning systems are of critical assistance to a GPS receiver. See paragraph [0043]. In paragraph [0034], for example, Wood et al discloses calculating a straight distance based on a unit period of time and speed measurements obtained from speed sensor, i.e. non-GPS velocity. See also paragraphs [0044], [0048], [0050]-[0052].

Also, Sato [US 2004/0210383], cited in the prior office action, discloses a car navigation system and car navigation control method that uses both a GPS sensor (1c) and a vehicle speed sensor (1b).

Also, Geier et al [5,416,712], cited in the prior office action, discloses a combined (integrated) GPS and dead-reckoning navigation sensor for a vehicle.

Shibata et al [5,337,243] also discloses a vehicle orientation calculating device that calculates a straight distance of vehicle using signal received from a GPS received and data (speed) from a velocity sensor.

Upon further consideration of the claims, it is found that claims 5 and 12 contain allowable subject matter. Accordingly, claims 5, 7-8 and 12-14 are being object to.

In light of the foregoing, as necessitated by the amendments, this office action is made final.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacques H. Louis-Jacques whose telephone number is 571-272-6962. The examiner can normally be reached on M-Th 5:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on 571-272-6956. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jacques H Louis-Jacques
Primary Examiner
Art Unit 3661

/jlj

JACQUES H. LOUIS-JACQUES
PRIMARY EXAMINER